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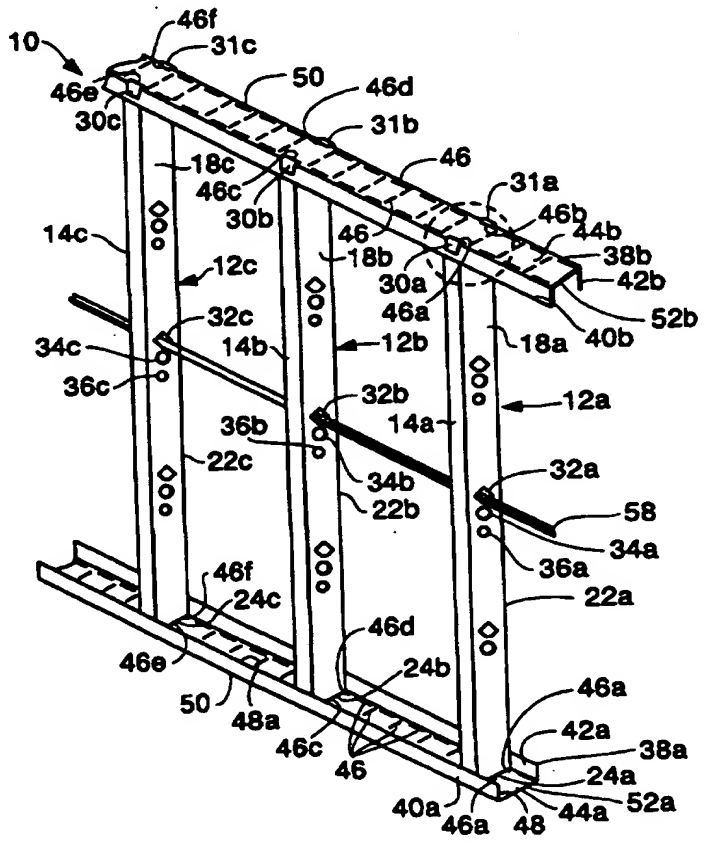
(54) Title: FRAME FOR A BUILDING STRUCTURE AND METHOD OF ASSEMBLING THE SAME

(57) Abstract

A metal frame (10) or an underlying support structure or substructure for a building structure which utilizes at least two displaced metal tracks (38) which each preferably have a plurality of slots (46) extending therethrough, and a plurality of metal studs (12) having at least one preferably integrally formed projection or tab (28) at preferably each of its ends. As such, a stud may be interconnected with each of the tracks (38) by passing its projections (28) through the aligned slots (46) on each of the tracks (38) and bending the same to interconnect the stud (12) with the tracks (38). This may be repeated for a plurality of studs (12) to form a frame of a desired size. Thereafter, a building material may be attached to the plurality of studs (12).



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FRAME FOR A BUILDING STRUCTURE AND METHOD OF ASSEMBLING THE SAME

FIELD OF THE INVENTION

The present invention generally relates to the field of building construction and, more specifically, to a frame or substructure which is assembled from a plurality of metal studs having a plurality of projections and from a plurality of metal studs having a plurality of slots such that the frame may be assembled simply by inserting projections into the aligned slots to interconnect the various metal studs in the form of a frame.

BACKGROUND OF THE INVENTION

Conventional construction of walls for a building structure typically involves assembling a number of wall frames on which building surfaces (e.g., drywall, siding) are installed. Wood studs (e.g., two-by-fours) are a common choice for erecting these wall frames or more specifically for framing. Generally, a series of vertically extending wood studs (e.g., two-by-fours) are spaced between and nailed to top and bottom horizontally extending wood studs (e.g. two-by-fours) to form a frame for a given wall. This frame structure is typically nailed together on the ground and is thereafter raised and anchored to the building structure's floor and interconnected with adjacent and similarly constructed wall frames.

Steel studs have also been a common choice for framing, typically in th cas of commercial building structures. The general manner of constructing the fram

and the resulting fram are each generally similar to that associated with wood studs. However, th interconnection between the various steel studs is typically generated by riveting or screwing the interfacing steel studs together versus nailing as in the case of wood stud frames.

The current frames being constructed in the above-described manners each have drawbacks associated therewith. Initially, wood is currently expensive and currently instable in cost such that the cost of the building structure is inflated when wood frames are utilized. Steel studs are currently comparatively cheaper than wood studs and currently more stable in cost than wood studs, and thus offer an attractive alternative from a material cost standpoint. However, many laborers are opposed to current techniques for assembling steel stud frames which requires the use of a rivet gun, screw gun, or the like. Moreover, in many cases it is more time consuming to construct a steel stud frame by the noted conventional techniqu s compared to a wood frame, which thereby offsets the decrease in material costs associated with steel stud frames compared to wood stud frames. Therefore, there is a need for an alternative technique for assembling a ste l stud frame such that the current material cost benefits associated therewith may be fully realized.

SUMMARY OF THE INVENTION

The present invention generally relat s to a fram or underlying support substructure for a building structure

which utilizes a quick and effective interconn ct between the various interfacing individual support members. In one application, the frame is for a wall which is formed from at least two displaced metal tracks which define the upper and lower extremes of the wall frame in the installed position (i.e., more than one track may be needed to define the entire length of a given wall frame), and from a plurality of metal studs which extend between and are interconnected with each of these tracks and which are typically vertically extending with the wall frame in the installed position. The present invention is specifically directed to the interconnection between the various of the interfacing individual support members, and thus between the metal studs and the track members in the wall frame application.

In the wall frame application, each of the noted tracks have a plurality of slots extending therethrough which are spaced along the length of the tracks, while each of the studs have at least one and typically two projections or tabs which extend away from each of their two ends. As such, the wall frame may be assembled by simply passing a projection on one end of a stud through one of the tracks and a projection on the opposite end of the stud through a slot in the other track. Thereafter, the projections on each end of the stud may be bent to establish an efficient and simple interconnection between th stud and the two tracks. A plurality of studs may be spaced along and interconnected with th tracks in the

noted manner. Once th wall frame is assembled in this manner, a building material such as drywall, insulation, and/or siding may be attached to the studs.

The above-noted principles on the interconnection between two members of an underlying support substructure or frame may be applicable to other framing applications. For instance, "frames" may be assembled for floors, ceilings, and/or roofs as well, although the configurations of the various members may vary and/or it may be possible/ desirable to utilize the above-discussed tab/slot interconnection only on one end of the "studs" or th plurality of parallel extending members. Moreover, the tab/slot interconnection may be utilized at locations other than the ends of the various interfacing support members which form the frame. Nonetheless, once the frame is constructed utilizing the tab/slot interconnection between at least some of the interfacing individual support members, a building material may be installed thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of one embodiment of an assembled wall frame;

Fig. 2 is a perspective view of one embodiment of a stud member which may be used in the assembly of the wall frame of Fig. 1;

Fig. 3A is a bottom view of one embodiment of a track member which may be used in the assembly of the wall frame of Fig. 1;

Fig. 3B is a perspective view of the track m mber of Fig. 3A;

Fig. 4 is an enlarged, perspective view of the interconnection between a stud member and the upper track member of the wall frame of Fig. 1;

Fig. 5 is a perspective view of the interconnection between a stud member and the lower track member of the wall frame of Fig. 1;

Fig. 6 is a perspective view of one embodiment of a lateral support member; and

Figs. 7A-G are cross-sectional views of various embodiments of support members inserted and positioned within a channel of the studs.

DETAILED DESCRIPTION

The present invention will be described in relation to the accompanying drawings which assist in illustrating its various features. In this regard and as noted, the present invention is generally directed toward a metal frame for a building structure. More specifically, the present invention relates to such a frame which utilizes a plurality of slots and tabs or projections which may be positioned therein and bent to establish a simple and quick, yet effective, interconnection between various members of the frame.

Referring to Fig. 1, a wall frame 10 may be constructed from a plurality of metal stud members 12 and at least two displaced metal track m mb rs 38 (i.e., more

than one track member 38 may be required to form the laterally xtending upper and lower sections of th frame 10). The stud members 12 are generally elongated along a longitudinal axis and are generally c-shaped in cross-section, having first and second legs 14, 16, respectively, and an intermediate leg 18 positioned therebetween. Similarly, the track members 38 are elongated along a longitudinal axis and are generally c-shaped in cross-section, having first and second legs 40, 42 and an intermediate leg 44 therebetween. In order to adequately support a wall of a building structure, the stud members 12 and track members 38 should be of a sufficient rigidity and thus structural integrity to withstand certain compressive, tensile and torsional forces. However, due to the manner in which the stud members 12 and track members 38 are interconnected, namely by the insertion of tabs 28, 29, 30, 31 which extend from the stud members 12 into slots 46 formed in the track members 38 and bent over as will be discussed in more detail below, the frame 10 members and particularly the stud members 12 should also be fabricated from a material which accommodates forces in this particular type of interconnection. In this regard, the stud members 12 and track members 38 may be fabricated from materials such as steel. Preferably, the stud members 12 and track members 38 are fabricated from steel or carbon steel having a gauge between about 25-16.

As illustrated in Fig. 1, the wall frame 10 generally includes a plurality of typically vertically extending stud

members 12 which are interconnect d with the typically horizontally extending track members 38 of the frame 10 as illustrated in the "as installed" position. Referring to Fig. 2, the stud members 12 again include first and second legs 14, 16, respectively, and the intermediate leg 18 therebetween, but in addition also include inner and outer surfaces 20, 22, respectively, and first and second ends 24, 26. In order to securely interconnect the stud members 12 and the track members 38, two sets of tabs 28, 29 and 30, 31 are provided at the first and second ends 24, 26, respectively, of the stud members 12. In particular, the first end 24 of the stud members 12 includes tabs 28 and 29 in order to secure the first end 24 of the stud member 12 to the track member 38a. Similarly, the second end 26 of the stud members 12 includes tabs 30 and 31 to secure the second end 26 of the stud member 12 to the track member 38b. Although each of the tabs 28, 29, 30, 31 may be mechanically fastened or attached to the first and second ends 24, 26, respectively, of the stud members 12, preferably the tabs 28, 29, 30, 31 are integrally formed with the entirety of the stud members 12. Moreover, although two tabs are shown at each end of the stud members 12, different numbers of tabs may be utilized.

The tabs associated with the stud member 12 may also assume a variety of positions. For instance, generally, the tabs 28, 29, 30, 31 of the first and second ends 24, 26, respectively, may be associated with the intermediate leg 18 and/or one or more of the legs 14, 16 of th stud

members 12. Continuing to refer to Fig. 2, the tabs 28 and 29 of the first end 24 are illustrated as being associat d with the intermediate leg 18. However, the tabs 30 and 31 of the second end 26 are illustrated as being associated with the legs 14, 16, respectively. Various combinations of positionings of the tabs may be utilized as each tab may b associated with one of the first and second legs 14, 16, respectively, on each end of the stud member 12 (not shown). Moreover, each tab may be associated with the intermediate leg 18 on both ends of the stud members 12 (not shown). Finally, and as shown in Fig. 2, the tabs on one end of the stud members 12 may be associated with the intermediate leg 18 while the tabs on the other end of the stud members 12 may be associated with the legs 14, 16.

The stud members 12 interface with the vertically displaced track members 38 which function as upper and lower headers. Referring to Figs. 3A and 3B, the track members 38 again include the first and second legs 40, 42 with the intermediate leg 44 therebetween. In addition, the track members 38 also include inner and outer surfaces 48, 50, respectively, and first and second ends 52, 54, respectively. Generally, in order to accommodate an effective yet simple interconnection with the stud members 12, the distance between the inner surfaces 48 of the first and second legs 40, 42 of the track members 38 should b greater than or substantially equal to the distance between the outer surfaces 22 between the first and second legs 14, 16 of the stud members 12. In this regard, a portion of the

outer surface 22 of the stud members 12 should contact at least a portion of the inner surface 48 of the track members 38 when the stud members 12 are positioned within and secured to the track members 38. In order to accommodate the tabs 28, 29, 30, 31 of the first and second ends 24, 26 of the stud members 12, the track members 38 also include a plurality of slots 46 therethrough, the position of which is such that each tab is aligned with one of the slots 46. As such, the slots 46 may be positioned in the intermediate leg 44 and may generally extend perpendicular to the longitudinal axis of the track member 38 (e.g., members 38a in Fig. 1), and a slot 46 may also be positioned generally at the intersection between the intermediate leg 44 and one of the first and second legs 40, 42 and may extend parallel to the longitudinal axis of the track member 38 (e.g., member 38b in Fig. 1).

Since the tabs of the stud members 12 and the slots 46 of the track members 38 provide the interconnection for the frame 10, the interface therebetween can affect the ease of assembly and/or the integrity of the frame 10. For instance, as shown in Fig. 2, the tabs 28, 29, 30, 31 at the first and second ends 24, 26, respectively, of the stud members 12 are appropriately sized such that the tabs 28, 29, 30, 31 may be received within the corresponding slots 46 of the track members 38. Preferably, the width and thickness of the tabs 28, 29, 30, 31 correspond to the width and thickness of the slots 46 such that when the tabs 28, 29, 30, 31 are inserted into th slots 46 of the track

members 38, at least a portion of the edges 25, 27 of the ends 24, 26 contact the inner surface 48 of the corresponding track member 38. The cross-sectional area of the portion of the tabs 28, 29, 30, 31 which is first inserted into the slots 46 may be less than the cross-sectional area of each of the slots 46 and such that the tabs 28, 29, 30, 31 are readily receivable within the slots 46, although a "snug fit" may also be utilized. As such, the maximum cross-sectional area of the tabs 28, 29, 30, 31 of the stud members 12 should be equal to or less than the cross-sectional area of the slots 46 of the track member 38.

In order to provide for a secure interconnection between the stud members 12 and the track members 38, the tabs 28, 29, 30, 31 of the first and second ends 24, 26, respectively, of the stud members 12 should also extend a sufficient distance beyond the first and second ends 24, 26 of the stud members 12. More specifically, the length of the tabs 28, 29, 30, 31 of the stud members 12 should exceed the thickness of the corresponding track member 38 such that the tabs 28, 29, 30, 31 may be inserted into slots 46 of the track members 38 and bent over to a desired degree. In this regard, when inserted through the slots 46 of the track members 38, a substantial portion of the tabs 28, 29, 30, 31 should protrude through the track member 38 such that the protruding portion of the tabs 28, 29, 30, 31 may be bent to secure the first and second ends 24, 26 of the stud members 12 to the track members 38. Preferably,

the tabs 28, 29, 30, 31 are bent such that a portion of the tabs 28, 29, 30, 31 contacts at least a portion of th outer surface 50 of the corresponding track member 38 (e.g., the tabs are typically bent at least 90°).

Generally, as illustrated in Figs. 1, 3A, 3B, 4 and 5, in order to receive the tabs 28, 29, 30, 31 of the stud members 12, one of the slots 46 of the track members 38 need to be aligned with a tab on a stud member 12 when properly positioned. As noted above, the slots 46 are typically located to some degree within the intermediate leg 44 of the track members 38 (e.g., in a "central" portion thereof and disposed generally perpendicular to the track member's 38 longitudinal axis, or in a "perimeter portion" thereof and parallel with this axis). Although the track members 38 may have only one "type" of slot 46 (not shown), in order to make this track member 38 more "universal," both types of slots 46 may be utilized. Moreover, since "stud spacings" in given wall frames may be varied, although typically in multiples of four, (e.g. twelve or sixteen inches or twenty-four inches on center), the longitudinal spacings of the slots 46 may accommodate for different stud spacings. For instance, the slots 46 may be positioned every four inches (e.g. every four inches "on center") along the longitudinal axis of the track member 38. Thus, it can be appreciated that a plurality of stud members 12 may be interconnected with the track members 38 at twelve, sixteen, or twenty-four inch intervals, as required/desired.

As the tabs 28, 29, 30, 31 of the stud members 12 and the slots 46 of the track members 38 have been appropriately sized, positioned, and oriented such that the tabs 28, 29, 30, 31 of the stud members 12 are receivable in the slots 46 of the track members 38, the stud members 12 may be interconnected with the two displaced track members 38 to form a wall frame 10. Typically, the frame 10 is assembled in a "prone" position (i.e., on the ground), and is thereafter "raised" and attached to the floor of the building structure. Referring now to Figs. 1, 4 and 5, one or more track members 38a (one shown) are disposed in spaced and opposing relation to one or more track members 38 to form the upper and lower headers or caps. Thereafter, the tabs 28, 29, 30, 31 at the first and second ends 24, 26 of one of the stud members 12 are inserted into the corresponding slots 46 of the track members 38a and 38b. In order to complete the interconnection, the portion of the tabs 28, 29, 30, 31 which extends beyond the members 38 are bent over (e.g., by hammering or by hand) to securely interconnect the stud members 12 with the track members 38. More specifically, the tabs 28a, 29a at the first end 24a of a first stud member 12a may be inserted into a first set of slots 46a, 46b of a first track member 38a. Once inserted, the tabs 28a, 29a at the first end 24 of the first stud member 12a may be bent over to the desired degree, preferably such that at least a portion of the tabs 28a, 29a contacts the outer surface 50 of the track member 38a. Contacting a

portion of the tabs 28a, 29a with the outer surface 50 of the track member 38a not only provides for a secure interconnection between the stud member 12a and the track member 38a, but also provides for a more stable association between the wall frame 10 and its supporting surface. This procedure may be repeated for each of the stud members 12 to be interconnected with the track member(s) 38a. That is, all of these stud members 12 may be attached to the track member(s) 38a before being attached to the support member(s) 38b. As such, the tabs 28b, 29b, 28c, 29c at the first ends 24b, 24c of the second and third stud members 12b and 12c may be similarly inserted into slots 46c, 46d and 46e, 46f, respectively, of the first track member 38a and bent such that a portion of the tabs 28b, 29b, 28c, 29c of the second and third stud members 12b, 12c, respectively, contact the outer surface 50 of the track member 38a.

After the stud members 12 to be associated with the track member(s) 38a are appropriately attached thereto, they may be similarly interconnected with the track member(s) 38b. That is, the tabs 30, 31 at the second ends 26 of the stud members 12 may be interconnected with the track member(s) 38b to assemble the wall frame 10. In this regard, tabs 30a, 31a at the second end 26a of the first stud member 12a may be inserted into the slots 46a, 46b of the second track member 38b and bent to securely interconnect the first stud member 12a with the sec nd track member 38b. As with the tabs 28a-c, 29a-c of the

first, second and third stud members 12a, 12b, 12c, respectively, the tabs 30a, 31a at the second end 26a of the first stud member 12a should be bent such that a portion of the tabs 30a, 31a of the first stud member 12a contacts the outer surface 50 of the second track member 38b, as shown in Fig. 4. In order to securely interconnect the second and third stud members 12b, 12c to the second track member 38b, the tabs 30b, 31b, 30c, 31c at the second ends 26b, 26c of the second and third stud members 12b, 12c, respectively, may similarly be inserted into the slots 46c, 46d and 46e, 46f of the second track member 38b and bent such that a portion of the tabs 30b, 31b, 30c, 31c of the second and third stud members 12b, 12c, respectively, contact the outer surface 50 of the second track member 38b. As can be appreciated, it may be desirable to effectively "simultaneously" insert all of the tabs on the second ends 26 of each of the stud members 12 into the corresponding slots 46 of the track member(s) 38b.

Once assembled, the wall frame 10 may be "stood up" and positioned substantially upon a track member 38 in order to secure the wall frame 10 to a supporting surface. In this regard, the wall frame 10, and more specifically, the track member 38a may be secured to the supporting surface by a number of fasteners selected from the group consisting of nails, rivets, bolts, screws, or other specialty fasteners. Once secured, a variety of materials, such as wood or drywall may be attached to the wall frame 10 along the stud members 12 and/or the track members 38 to

form a building surface, namely, a wall. Adjacent wall frames may be similarly assembled and appropriately interconnected with the wall frame 10.

In order to provide additional structural stability to the wall frame 10, one or more lateral support members 58 may be associated with the stud members 12 as illustrated in Figs. 1, 6 and 7A-G. The support members 58 reduce the potential for lateral bowing, bending and/or deformation of the stud members 12 and therefore assist in keeping the stud members 12 aligned and straight. In this regard, the support members 58 may be particularly useful in providing additional structural stability to load bearing walls.

In order to accommodate one or more lateral support members 58, each of the stud members 12 of the wall frame 10 preferably include a plurality of vertically spaced first holes 32 which extend through the respective intermediate leg 18. The stud members 12 may also include a plurality of vertically or longitudinally spaced second and third holes 34, 36, respectively, which extend through the respective intermediate leg 18 to accommodate piping (i.e., plumbing), electrical wiring and/or other such "conduits".

As illustrated in Figs. 1 and 2, for purposes of structural stability, the first channel 32 of each stud member 12 is positioned substantially between the first and second legs 14, 16 of the stud members 12 such that a support member 58 secured therein would substantially inhibit lateral bowing, bending and deformation. In this

regard, the first hole 32 of each stud member 12 should be sized to appropriately receive the corresp nding supp rt members 58. Preferably, the maximum cross-sectional width of the support member 58 is less than the width or diameter of the corresponding first hole 32 such that the support members 58 may be readily inserted into the first hole 32 of each support member 12. As illustrated in Figs. 7A-G, the support members 58 may comprise a variety of cross-sectional shapes, including shapes selected from the group consisting of c-shapes, v-shapes, u-shapes, and linear shapes, while the first holes 32 of the stud members 12 may comprise cross-sectional shapes selected from the group consisting of diamonds, trapezoids, circles, squares, rectangles, rhombuses, pentagons, and other polygons.

In order to provide for a quick and yet effective interconnection between each support member 58 and its corresponding stud members 12, the support member 58 preferably includes a plurality of longitudinally spaced notches 60 along a longitudinal axis of the support member 58. The width of such notches 60 preferably substantially corresponds to a thickness of the stud members 12. More specifically, the width of each notch 60 should be equal to or slightly greater than the thickness of the intermediate legs 18 of the stud members 12. Moreover, the notches 60 may be appropriately spaced to accommodate one or more stud spacings. For instance, the notches 60 may be formed or cut into the support members 58 at four inch intervals to accommodate th possible stud memb r 12 locations along the

track members 38 consistent with the spacings noted ab ve.

In order to efficiently ngage th notches 60 of th support members 58 with the first channels 32a, 32b, 32c of each stud member 12a, 12b, 12c, the support members 58 should first be inserted through the desired first channels 32a-c of the stud members 12a-c in an inverted or "upside down" orientation as shown in the left-hand side views of Figs. 7A-G. Such an inverted orientation of the support members 58 inhibits accidental interlocking engagement of the notches 60 with the first channels 32 when sliding the support member 58 through the stud members 12. In this regard, once inserted in the inverted orientation such that the notches 60 of the support member 58 have been substantially positioned in vertical alignment with a first channel 32 of a corresponding stud member 12 (i.e., aligning notches 60a, 60b, 60c of the support member 58 with the first channels 32a, 32b, 32c of the stud members 12a, 12b, 12c, respectively), the support member 58 may be turned about or "flipped" such that the notches 60 of the support member 58 may securely engage or receive a portion of the intermediate leg 18 surrounding the first channel 32 of each stud member 12 as illustrated in the right hand side view of Figs. 7A-G. Although the members 58 may be installed with the frame 10 in the "raised" position, as discussed, the members 58 may be installed as part of the initial assembly procedure.

Although the present inv ntion has been describ d with regard to establishing an underlying support structure or

a substructure for a wall, it will be appreciated that th principles of th present invention may b ext nded to other substructure applications in building construction. For instance, the above-discussed interconnection between the studs and the upper and lower track members (e.g., tabs on one member and slots in the interfacing members) may b used for floor framing or more specifically for assembling the typically U-shaped rim joists and the plurality of typically I-shaped floor joists which extend between two displaced rim joists. In fact, the tab and slot interconnection may be utilized to form the generally I-shaped floor joists or other support members from two generally C-shaped studs placed back to back (e.g., a plurality of tabs may be spaced along the intermediate leg of a generally C-shaped channel member to align with a plurality of slots spaced along the intermediate leg of another generally C-shaped channel member such that when the C-shaped channel members are placed "back-to-back" with the tabs positioned within the slots and bent as noted, an I-shaped beam is formed). Nonetheless, once the floor frame is constructed generally in the above-described manner, a plywood deck may be attached to the floor joists.

The above-discussed interconnection between the plurality of studs and the upper and lower track members (e.g., tabs on one member and slots in the interfacing member(s)) may also be used for roof framing or more specifically for assembling the main substructure for the roof of a building structure (e.g., trusses, rafters).

Depending upon th particular type of frame being constructed, the configuration of the frame constituents (e.g., the studs and track members) may vary. Moreover, the tab/slot interconnection need not be utilized to attach a "stud" to each of the two displaced "track members". Instead and possibly dictated by the particular framing application, one end of the plurality of parallel extending "studs" may interface with a "track member" in the above-described manner (i.e., with tabs and slots), while the opposite ends of the "studs" may be attached to the other "track member" by other methods (e.g., bolting, riveting, screwing, welding). Moreover, the tab/slot interconnection need not be necessarily on the "ends" of the individual support members forming the frame, but may be located at intermediate locations between the respective ends. Nonetheless, after a frame is constructed utilizing a tab/slot interconnection on at least one end of the "studs", a building material (e.g., siding, sheet rock, insulation, plywood) may be appropriately attached or hung of the plurality of "studs."

The foregoing description of the present invention has been presented for purposes of illustration and description. However, the description is not intended to limit the invention to the form disclosed herein. Consequently, variations and modifications of that described herein, commensurate with the above teachings and/or the skill and knowledge of the relevant art, are within the scope of the present inv ntion. The mbodiments

described hereinabove are further intended to explain best modes known of practicing the invention and to enable others skilled in the art to utilize the invention in such or other embodiments and with the various modifications required by the particular applications or uses of the present invention. It is intended that the appended claims be construed to include alternative embodiments to the extent permitted by the prior art.

What is claimed is:

1. A method for assembling a frame for a building structure from a plurality of metal studs and metal tracks, each said stud being longitudinally extending with first and second ends and comprising a first projection on each of said first and second ends, each said track being longitudinally extending and having a plurality of longitudinally spaced slots extending therethrough, said method comprising the steps of:

positioning a first and second of said tracks in displaced and at least partially opposing relation;

inserting said first projection on said first and second ends of one of said studs through a corresponding said slot on said first and second tracks, respectively;

bending said first projection on said first and second ends of said one stud to secure said one stud to said first and second tracks; and

repeating said inserting and bending steps for a plurality of said stud members at longitudinally displaced locations on said first and second tracks.

2. A method, as claimed in Claim 1, wherein:

said first projection on each of said studs extends generally along a longitudinal axis of said stud member and wherein said bending step comprises bending each of said first projections at least about 90°.

3. A method, as claimed in Claim 1, wherein:

said studs and said tracks each comprise first and second longitudinally extending and laterally displaced

legs with a longitudinally extending intermediate leg therebetween, said first projection on said first end of said one stud being associated with said intermediate leg of said one stud, said method further comprising the step of engaging at least a portion of said first projection on said first end of said one stud with a corresponding portion of said intermediate leg of said first track using said bending step.

4. A method, as claimed in Claim 3, wherein:

said studs further comprise a second projection on said intermediate leg on said first end of each of said studs which is displaced from said first projection on said intermediate leg on said first end of said studs, said method further comprising the steps of inserting said second projection on said first end of one of said studs through a corresponding said slot on said first track, bending said second projection on said first end of said one stud, and engaging at least a portion of said second projection on said first end of said one stud with a corresponding portion of said intermediate leg of said first track using said bending step.

5. A method, as claimed in Claim 1, wherein:

said studs and said tracks each comprise first and second longitudinally extending and laterally displaced legs with a longitudinally extending intermediate leg therebetween, said first projection on said first end of said one stud being associated with said first leg of said one stud, said method further comprising the step of

engaging at least a portion of said first projection on said first end of said one stud with a portion of said first track using said bending step.

6. A method, as claimed in Claim 5, wherein:

said portion of said first track comprises a portion of said intermediate leg of said first track.

7. A method, as claimed in Claim 5, wherein:

said portion of said first track comprises a portion of said first leg of said first track.

8. A method, as claimed in Claim 5, wherein:

said studs further comprise a second projection on said second leg on said first end of each of said studs, said method further comprising the steps of inserting said second projection on said first end of one of said studs through a corresponding said slot on said first track, bending said second projection on said first end of said one stud, and engaging at least a portion of said second projection on said first end of said one stud with a corresponding portion of said first track using said bending step.

9. A method, as claimed in Claim 8, wherein:

said portion of said first track comprises a portion of said intermediate leg of said first track.

10. A method, as claimed in Claim 8, wherein:

said portion of said first track comprises a portion of said second leg of said first track.

11. A method, as claimed in Claim 1, wherein:

each of said studs furth r comprises a first chann l positioned between said first and second ends, said method further comprising the step of:

interconnecting a plurality of said stud members interconnected with said first and second track members using said first channels, comprising the steps of providing a first longitudinally extending support member having a plurality of longitudinally spaced notches and interfacing one of said notches with one of said first channels for each of said plurality of stud members.

12. A frame for a building structure, comprising:

upper and lower laterally extending metal tracks comprising a plurality of laterally displaced slots extending therethrough;

a plurality of longitudinally extending and laterally spaced metal studs extending between said upper and lower tracks, each said stud comprising first and second ends and a first projection on each of said first and second ends, each of said first projections extending through one of said slots on one of said first and second tracks and being bent to interconnect a corresponding said stud with a corresponding of said first and second tracks.

13. A frame, as claimed in Claim 12, wherein:

said plurality of studs and said upper and lower tracks each comprise first and second linearly extending and spaced legs with a linearly extending intermediate leg therebetw en, at least a portion of said first projection

on at least one of said ends of each of said studs being associated with said intermediate leg of a corresponding said stud and being in engaging relation with a corresponding portion of said intermediate leg of one of said upper and lower tracks.

14. A frame, as claimed in Claim 12, wherein:

said plurality of studs and said upper and lower tracks each comprise first and second linearly extending and spaced legs with a linearly extending intermediate leg therebetween, at least a portion of said first projection on at least one of ends of said plurality of studs being associated with said first leg of a corresponding said stud and being in engaging relation with a portion of one of said upper and lower tracks.

15. A frame, as claimed in Claim 14, wherein:

said portion of one of said upper and lower tracks comprises a portion of said intermediate leg of said one of said upper and lower tracks.

16. A frame, as claimed in Claim 14, wherein:

said portion of one of said upper and lower tracks comprises a portion of said first leg of said one of said upper and lower tracks.

17. A frame, as claimed in Claim 12, further comprising:

a second projection on each of said first and second ends of said plurality of stud members, each said second projection extending through one of said slots on one of said first and second tracks and being bent to interconnect

a corresponding said stud member with a corresponding said upper and low r track member.

18. A frame, as claimed in Claim 12, wherein:

each of said studs further comprise a first channel positioned between said first and second ends, said fram further comprising a first laterally extending support member comprising a plurality of laterally spaced notches, one of said notches interfacing with one of said channels for each of said plurality of studs.

19. A method for assembling an underlying support structure for a building structure from a plurality of metal studs and at least one first and second metal track, each said stud being longitudinally extending with first and second ends and comprising a first projection on at least one of said first and second ends, each of said first and second tracks being longitudinally extending, each of said first tracks further having a plurality of longitudinally spaced slots extending therethrough, said method comprising the steps of:

positioning said first and second tracks in displaced and at least partially opposing relation;

inserting said first projection on said first end of one of said studs through a corresponding said slot on said first second track;

bending said first projection on said first end of said one stud to secure said one stud to said first track;

attaching said second end of said one stud to said second track;

repeating said inserting, bending, and attaching steps for a plurality of said stud members at longitudinally displaced locations on said first and second tracks; and

securing a building material to said plurality of stud members after said repeating step.

20. A method for assembling an underlying support substructure for a building structure from a plurality of studs, wherein a plurality of first said studs are each generally longitudinally extending with first and second ends and comprise at least one projection, wherein a plurality of second said studs are each generally longitudinally extending with first and second ends and comprise at least one slot, said method comprising the steps of:

orienting one of said first studs relative to one of said second studs;

inserting one of said projections on said one of said first studs through a corresponding said slot on said one of said second studs;

bending said projection on said one of said first studs to secure said one of said first studs to said one of said second studs;

repeating said orienting, inserting, and bending steps a plurality of times to assemble an underlying support substructure; and

securing a building material to said support substructure after said repeating st p.

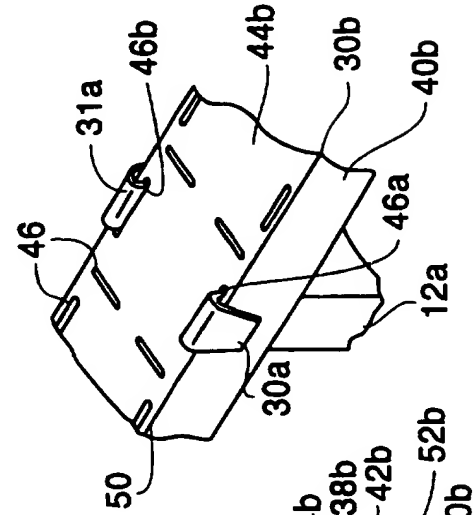

Fig. 4

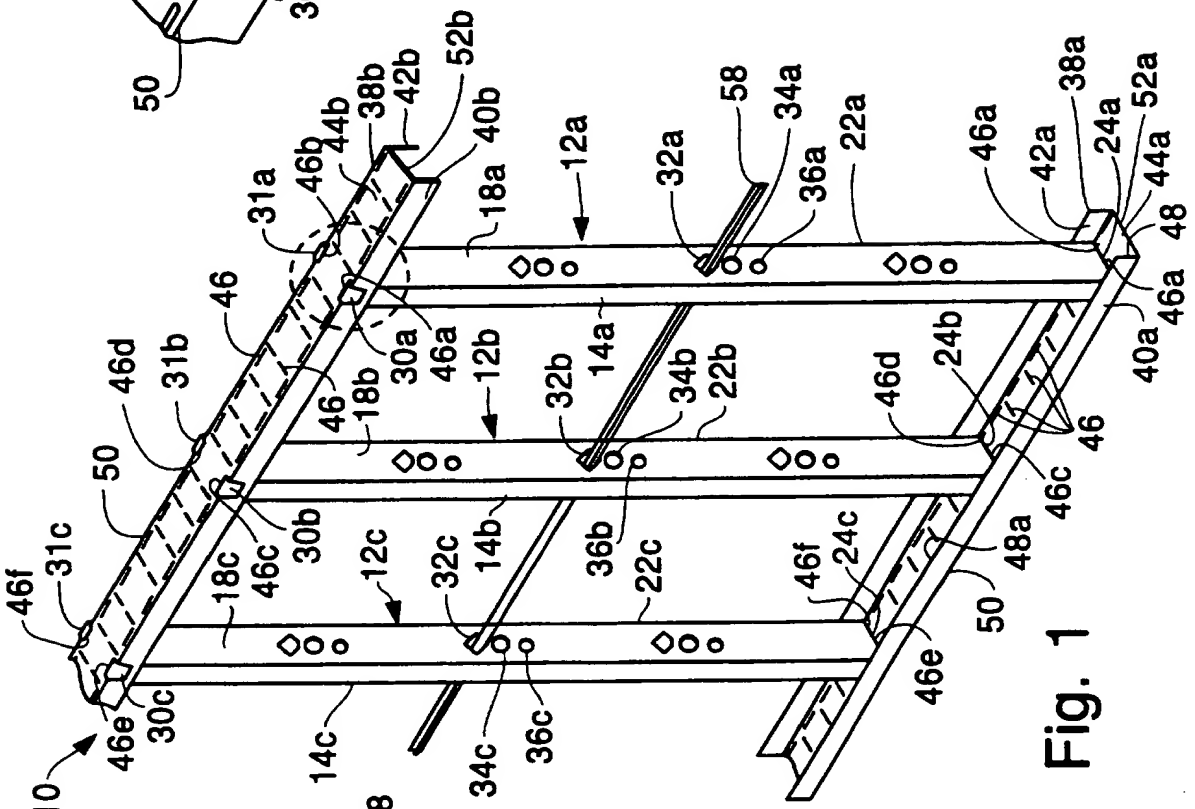

Fig. 1

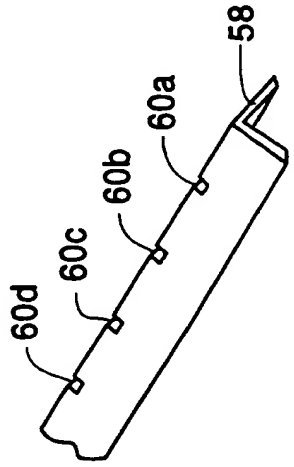

Fig. 6

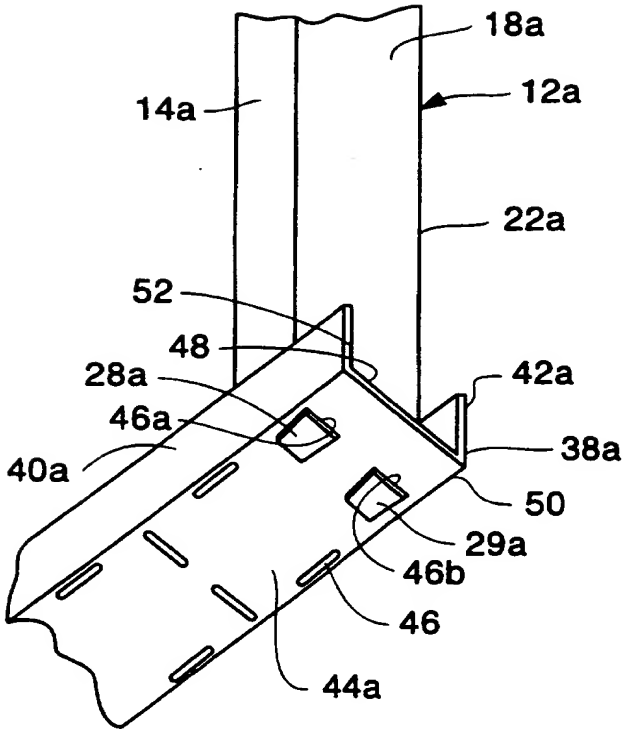

Fig. 5

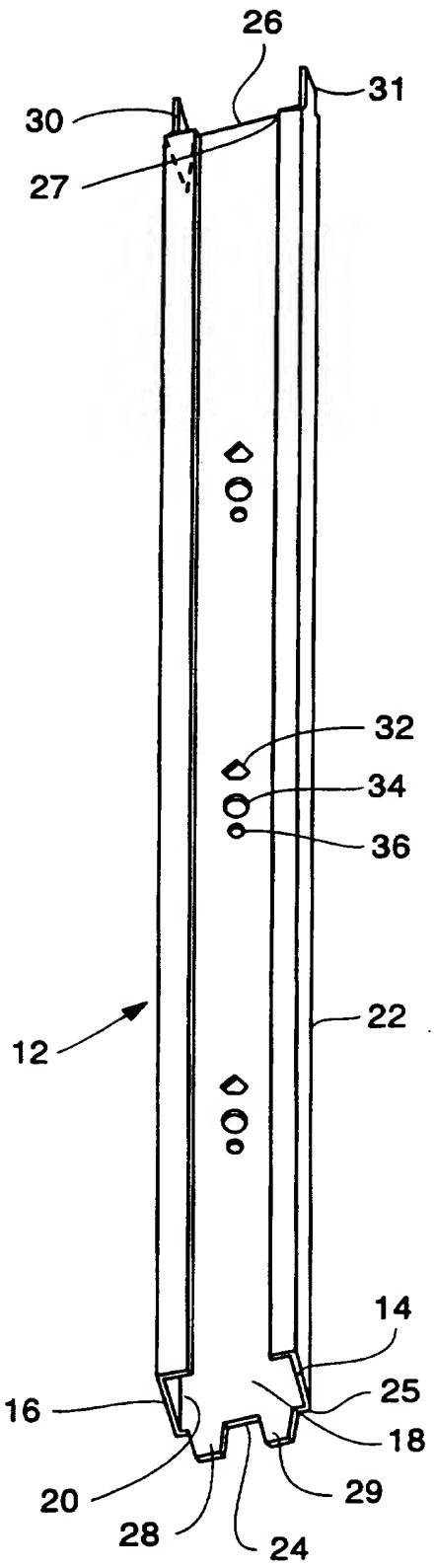

Fig. 2

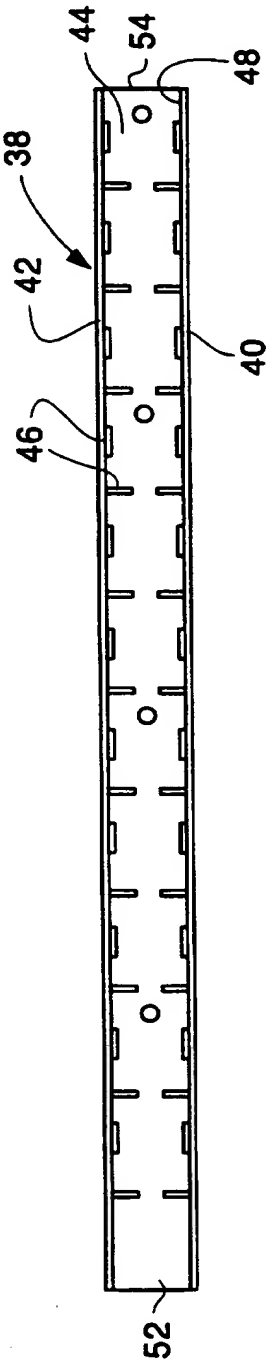

Fig. 3A

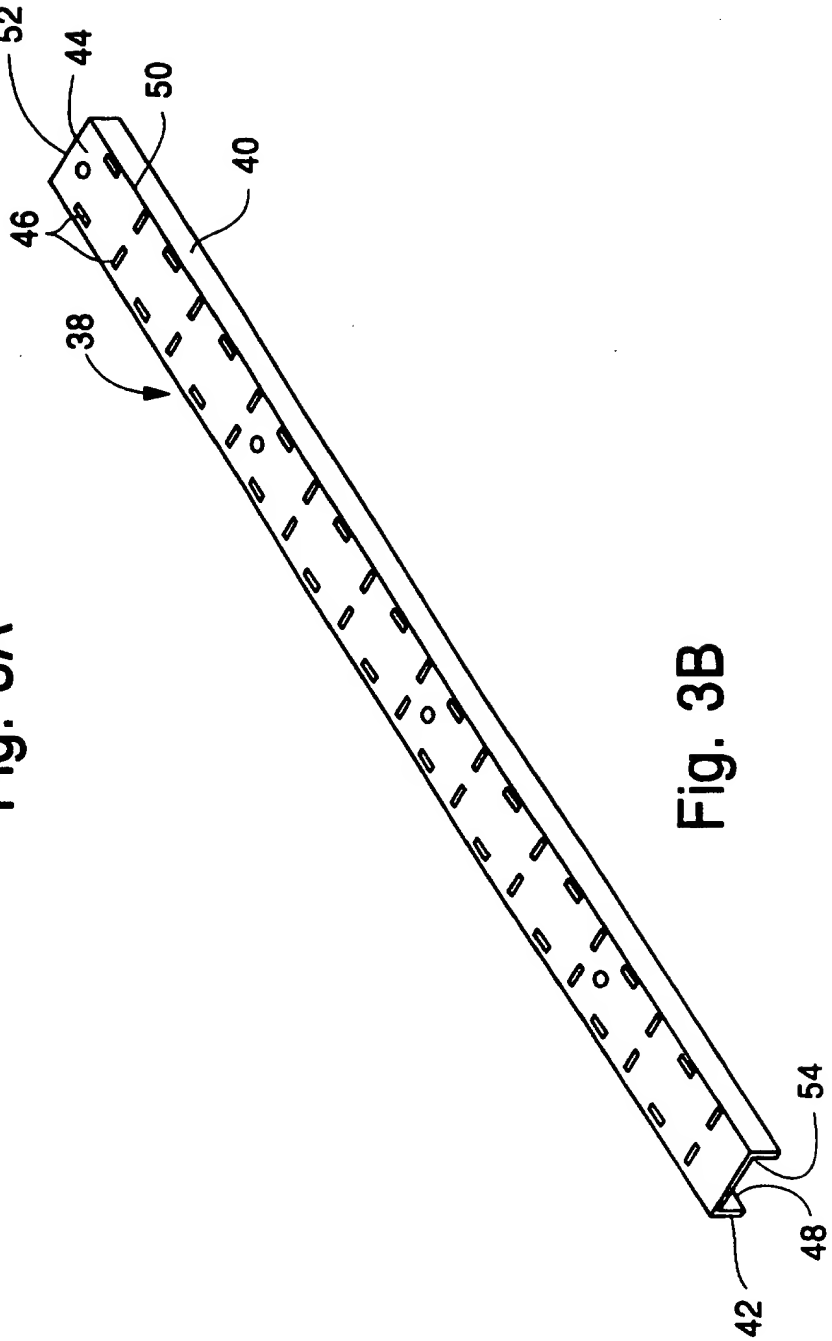

Fig. 3B

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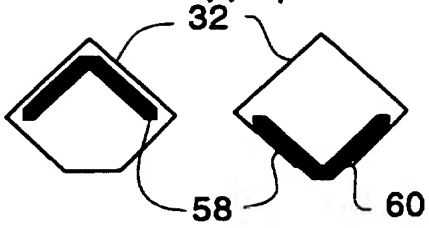

Fig. 7A

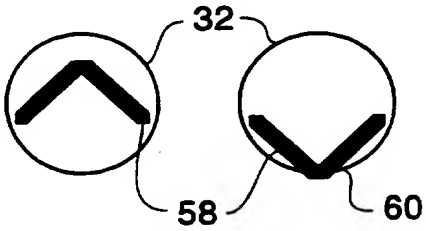

Fig. 7B

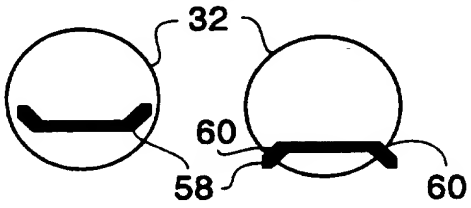

Fig. 7C

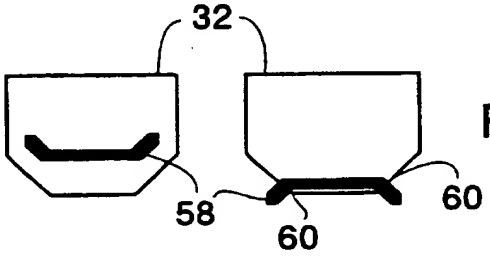

Fig. 7D

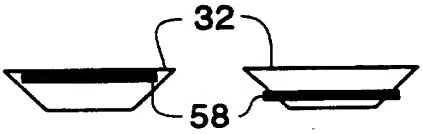

Fig. 7E

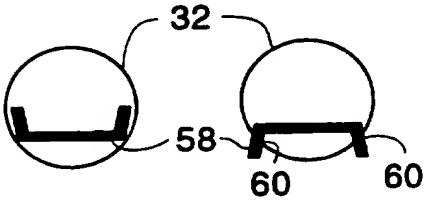

Fig. 7F

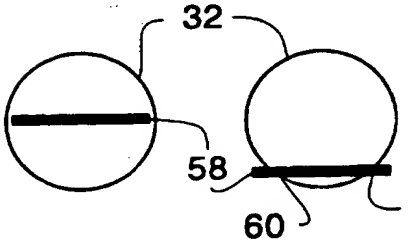

Fig. 7G

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/01522

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :E04H 1/04
US CL :52/653.1, 656.1, 731.5
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 52/241, 653.1, 656.1, 731.5, 731.9, 733.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,130,970 (CABLE) 26 DECEMBER 1978, SEE ENTIRE DOCUMENT	1-20
Y	US, A, 4,805,364 (SMOLIK) 21 FEBRUARY 1989, SEE ENTIRE DOCUMENT	1-20
A	US, A, 3,482,369 (BURKE) 09 DECEMBER 1969, SEE ENTIRE DOCUMENT	1-20
A	US, A, 3,845,601 (KOSTECKY) 05 NOVEMBER 1974, SEE ENTIRE DOCUMENT	1-20
A	US, A, 4,991,368 (AMSTUTZ) 12 FEBRUARY 1991, SEE ENTIRE DOCUMENT	1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
19 APRIL 1996

Date of mailing of the international search report
07 MAY 1996

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